2010 Update to Crested wheatgrass control and monitoring Benton Lake Refuge

Service Unit: Benton Lake NWR
Reporting Office: Benton Lake Complex
Species or group: Upland habitat - invasives
Title: Crested wheatgrass control and monitoring
BNL Biological Report: 3-10

This is a summary for 2010 – for full details on the study please see the 2008 report.

I. Materials and Methods

A pilot program to begin testing treatment effectiveness was started in 2008. One management unit of the refuge was chosen to treat established stands and pioneer CWG (Figure 1).

Pioneers

The same portion of the pilot area that was treated for pioneer plants in 2008 and 2009 was re-treated in 2010 by field technicians with backpack sprayers (Figure 1). The technicians walked back and forth across the treatment area systematically spraying pioneer plants. Glyphosate (1:2 mix of glyphosate:water) was applied to individual plants at a rate of 1.1 kg active ingredient/ha (Wilson and Partel 2003). We added a dye to make it easier to track coverage. Herbicide was applied at the 3-4 leaf stage, pre-seed in June (06-22-10).

Established Stands

Fortunately, at Benton Lake, much of the established CWG infestations are adjacent to road-sides. In the pilot area, the established CWG stands were evenly divided into 9 subplots of approximately 1 acre each. We divided the 9 plots into blocks of 3 subplots each from north to south and then randomly assigned one subplot in each block of three to either a mowing treatment, herbicide treatment or no treatment (control) (Figure 1).

Mowed subplots

We mowed CWG at the four leaf stage, just prior to seed head emergence, in early June (06-08-10). All plots were mowed with the bat-wing mower on the back of the tractor. This is the third year of mowing and despite above average precipitation, a second mowing was not necessary because the CWG plants never set seed a second time.

Herbicide subplots

Most of the CWG plants within the herbicide plots had been killed by the 2009 treatment, however, the few remaining plants were spot-treated with glyphosate (1:2 mix of glyphosate:water) at a rate of 1.1 kg active ingredient/ha with backpack sprayers in late June (06-22-10). Herbicide treatments were completed in one day with winds <10mph.

These plots were seeded with native grasses in November using a mixture of green needlegrass (65%), western wheatgrass (30%) and Sandberg's bluegrass (5%).

All grass stand							
	Optimum^ PLS lb/ac	% full seeding	Actual PLS lb/ac	Purity	Germ	PLS%	bulk seed lbs/ac
Green needlegrass	7.20	0.65	4.68	99.80	50.00	49.90	9.38
Western wheatgrass	11.90	0.30	3.57	94.90	91.00	86.36	4.13
Sandberg's bluegrass	2.00	0.05	0.10	99.15	64.00	63.46	0.16

The Haybuster seed drill was calibrated using the weight method (USFWS 1981). It was difficult to calibrate with the relatively small amount of seed.

Monitoring

Pioneer plants

We revisited 20 pioneer plants that were treated in 2008-2009. We marked an additional 15 plants treated in 2010. The total number of pioneer plants treated with backpack sprayers were counted by individuals as they sprayed.

Established stands

To monitor the effectiveness of these treatments we randomly established two 20m x 0.1m belt transects centered on, and perpendicular to, the invasion front for each subplot (Grant et al 2004). Each 0.5 x 0.1m section of the belt transect was assigned to one of three categories based on dominant vegetation (>50%): (1) native, (2) crested wheatgrass (3) other. From these we will be able to detect the spread of CWG into native prairie and/or the spread of native prairie back into the prior CWG stand. Percent cover of natives and CWG were estimated at the 0, 5, 10, 15 and 19m points along the belt transect using 1 x 0.5m frame (Daubenmire 1959). Data was collected in 2010 just prior to treatment.

II. Results

Pioneer plants

In 2010, only four of the twenty plants marked after spot-spraying in 2008-2009 were dead.

In the pilot area, 2485 crested wheatgrass plants were treated by the Strike Team.

Transects originally established in 2008 were revisited. The estimated total number of CWG plants for the pilot area is 14,573. The estimate for 2008, before treatments began, was 7,649.

Established stands

The community-level composition data for the belt transects placed at the CWG invasion front is shown in Figure 3. CWG declined by 22% since 2009 in the herbicide treatment plots. There was an increase of 7% native on the mowed plots. Other vegetation community types detected on the transects include bareground (predominantly on the herbicide treated - CWG side) and Japanese brome (predominantly on the native prairie side).

Percent cover measured in the smaller frames is shown in Figure 4. The frame at 10m is approximately at the invasion front. As expected, the frames outside the CWG stand (0m, 5m) had primarily native and those within the stand (15m, 19m) had primarily CWG. The percent of native cover increased in all treatments, but the largest increase was in the mowed plots, particularly at the invasion front.

III. Discussion

We continue to learn about treating crested wheatgrass and restoring native prairie. We seeded the herbicide treatment plots in November and will be interested to see the results. Ideally, the seeding would follow in the fall immediately after the herbicide treatment.

Mowing continues to be effective at preventing seed formation. We have had good precipitation the last couple of years which may be mitigating some of the stress we hoped to be placing on the CWG plants. It is interesting that native prairie seems to be increasing on the mowed plots. It is also increasing to a smaller degree in the control plots, so it may just be the beneficial precipitation we have received this year.

It may be that an effective future treatment will be 3 years of mowing to clean up the seed bank, follow up with 1-2 years of herbicide treatment and then seeding with native species.

Plans for 2011

Continue monitoring transects along the invasion front and marked pioneer plants.

IV. Literature citations

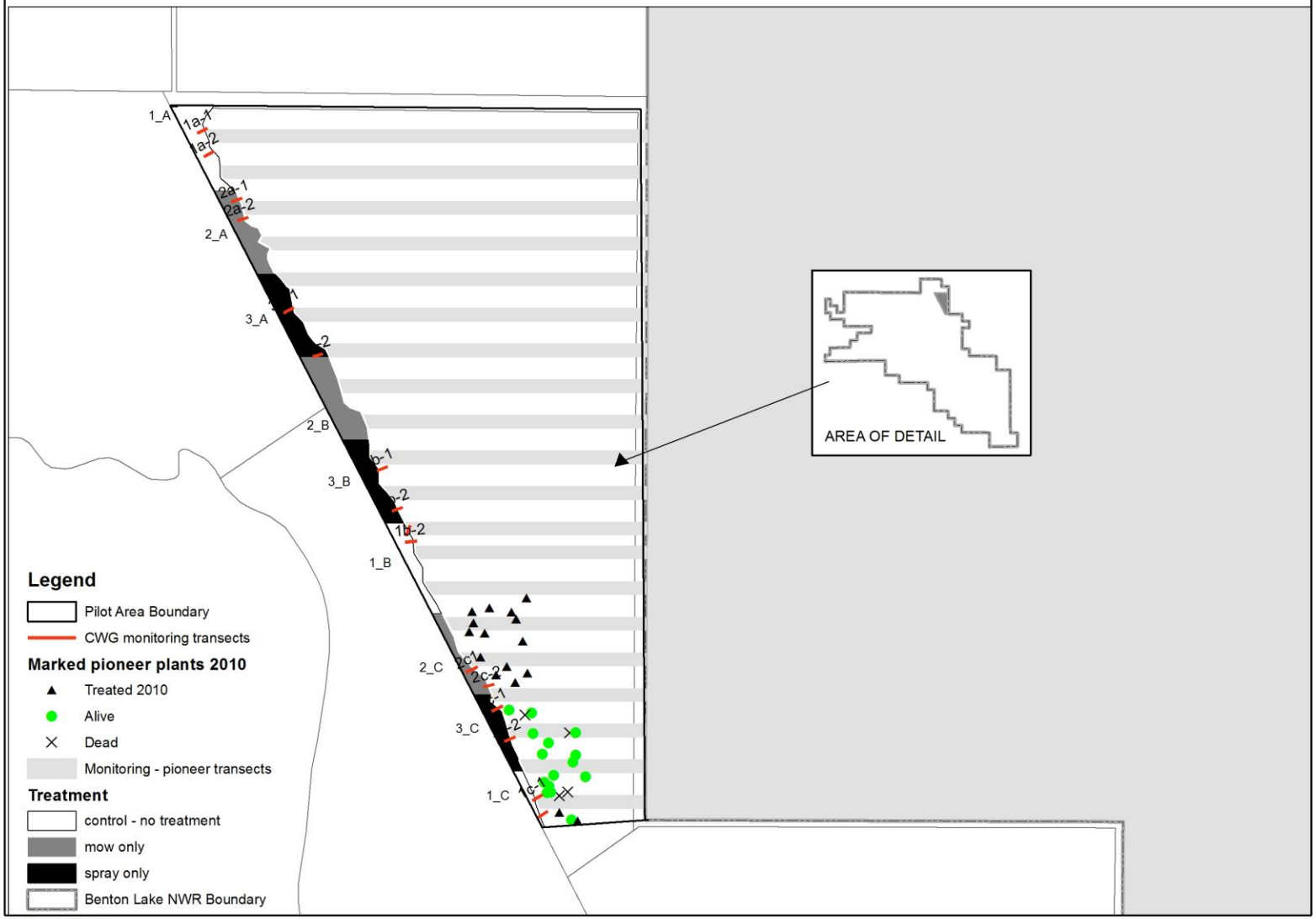
Wilson, SD and M Partel. 2003. Extirpation or coexistence? Management of a persistent introduced grass in a prairie restoration. Restoration Ecology 11(4):410-416.

USFWS. 1981.

U.S. Fish & Wildlife Service

Benton Lake National Wildlife Refuge

Figure 1. 2010 Crested Wheatgrass Pilot

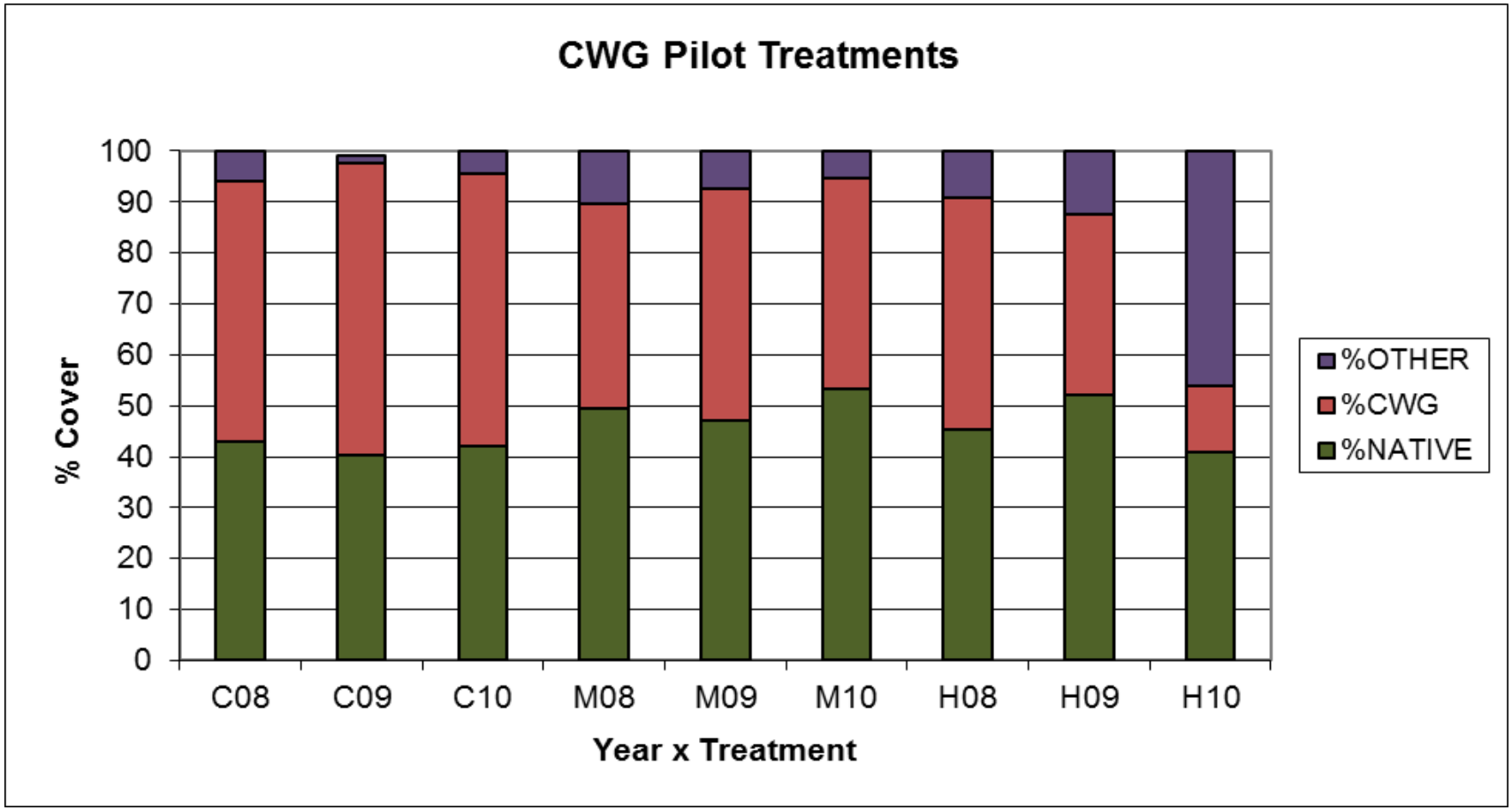


PRODUCED BY BENTON LAKE NWR
GREAT FALLS, MT
LAND STATUS CURRENT TO: 2008
MAP DATE: 03/18/2009
BASEMAP:
MERIDIAN: N/A
FILE: YFIELDS/BNL_BIOLOGICAL_PROGRAM/BIOTIC/NEGETATION
/UPLANDS/INVASIVES/CRESTED_WHEATGRASS/
GIS/PILOT/BNL_CWGPILOT_11.MXD

0 0.0325 0.065 0.13 Miles
0 0.0325 0.065 0.13 Kilometers

UTM ZONE 12
NAD 83

Figure 3. Baseline vegetation composition of belt transects placed at the invasion front for two treatments and control. (C=control plots, M=mowed plots and H=herbicide treatment plots).



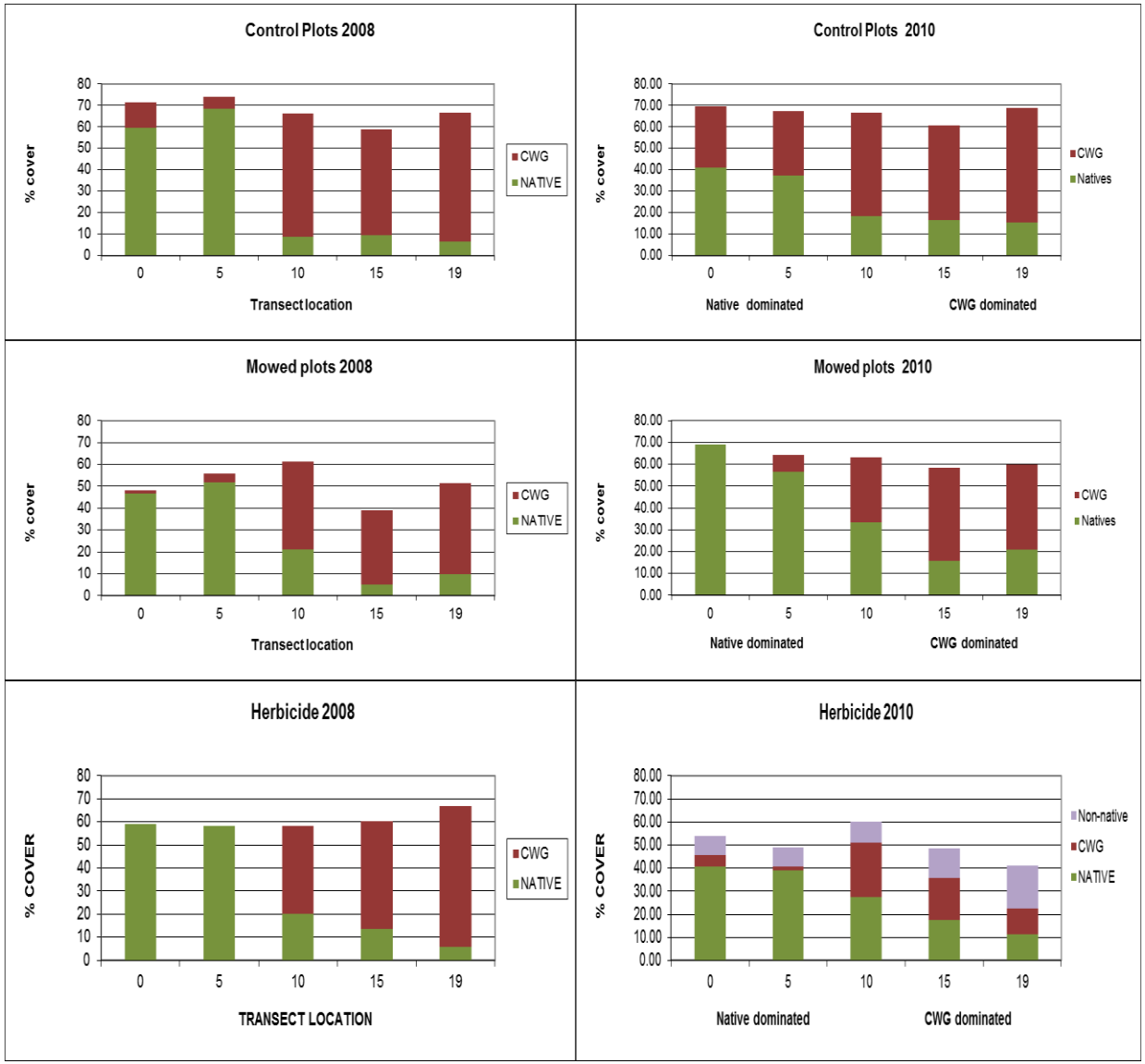


Figure 4. Changes in percent cover within transects (2008 left, 2010 right).